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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|-----------------------|--------------------------------|------------------------|
| 10/764,213 | 01/23/2004 | Alexander A. Oracvsky | FMT-OA.01US | 2189 |
| 29946 | 7590 | 09/10/2007 | | |
| TIM L. BURGESS, P.C. 402 OAK LANE HOUSTON, TX 77024 | | | EXAMINER SHAHRESTANI, NASIR | |
| | | | ART UNIT 3737 | PAPER NUMBER |
| | | | MAIL DATE 09/10/2007 | DELIVERY MODE PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/764,213 | ORAEVSKY ET AL. | |
| | Examiner | Art Unit | |
| | Nasir Shahrestani | 3737 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-56 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 and 24-56 is/are rejected.
- 7) ☒ Claim(s) 22-23, 59 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/11/2007; 5/01/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

Claim 55 objected to because of the following informalities: being dependent on non-existing claim 59. Appropriate correction is required. For purposes of art application, examiner construes claim 55 to be dependant on claim 54.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9, 54-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henrichs et al. (U.S. 6,662,040 B1) in view of Link et al. (NPL – “Shape and size dependence of radiative, non-radiative and photothermal properties of gold nanocrystals”).

Henrichs et al. teach a method of enhancing detection for a specific object in a body, Comprising the steps of:

- a) administering to said body a nanoparticulate (col. 19 lines 55-64); the nanoparticulate being at least partially metallic (col. 25 line 45), which inherently has a formed composition capable of producing thermal pressure either in said nanoparticulate or in said object greater than said object could produce as a result of EM radiation in the absence of said nanoparticulate; and
- b) directing onto said body specific EM radiation (col. 2 lines 3-9) having a wavelength or spectrum of wavelengths in the range from 300nm to 300mm (col. 8 lines 40-64), said

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nanoparticulate absorbing said EM radiation (abstract) and producing an enhanced optoacoustic signal resulting from said absorption (col. 1 lines 9-11).

Henrichs et al. do not specifically teach the use of a nanoparticulate formed in a non-spherical shape having a minimal characteristic dimension in the range from about 1 to about 3000 nanometers.

In the same field of endeavor, Link et al. teach a method of detection enhancement using optical absorption properties of metal nanoparticles having a non-spherical shape (fig. 1), having a mean aspect ration of 3.3 (pg. 413).

It would have been obvious to one of ordinary skill in the art at the time of invention to have modified the apparatus and method as taught by Henrichs et al. and to have incorporated gold nanorods as taught by Link et al. since the longitudinal plasmon resonance absorbing a longer wavelength is more effective in amplifying the fluorescence intensity in gold nanoparticles than the surface plasmon resonance of spheres, which could be due to the fact that longitudinal plasmon resonance is less damped and has a much larger oscillator strength (Link et al., pg. 423).

Henrichs et al. further teach detecting pressure waves generated in said body by said radiation and generating an optoacoustic image (abstract), and that in order to generate an image, the optoacoustic signal is inherently converted into an electrical signal. Henrichs et al. further teach wherein the interaction of said nanoparticulate with said object produces a shift of the absorption maximum by said nanoparticulate for said selected wavelength or range of wavelengths (col. 9 lines 66-67 – col. 10 lines 1-16). Henrichs et al. further teach wherein said wavelengths are in the visible and near infrared spectrum (col. 4 lines 19-30).

Claims 10-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Henrichs et al. (U.S. 6,662,040 B1) in view of Link et al. (NPL – “Shape and size dependence of radiative, non-radiative and photothermal properties of gold nanocrystals”) and in further view of Oldenburg et al. (U.S. 6,344,272 B1).

Henrichs et al. in view of Link et al. teach all the limitations of claim 6 but do not specifically teach said nanoparticles are combinations of nanoparticles of one shape and nanoparticles of another shape made of various mixtures.

Oldenburg et al. teach a method of photoacoustic imaging using metal nanoshells comprising the use particles that are mixtures being homogenous or non-homogenous in size and are comprised of a nonconducting inner layer that is surrounded by an electrically conducting material (abstract). The aggregate is comprised of spherical nanoparticles (fig. 1), in which said nanoparticle are at least partially coated with organic material, such organic material comprising genetic material or selected from gold, silver, platinum, a form of carbon having metallic properties, a mixture of at least two of said metals, or an alloy of at least two of said metals (col. 5 lines 66-67 – col. 6 lines 1-9). Oldenburg et al. further teach various probable sizes of diameters being solid (col. 5 lines 40-65), and that the absorbance maximums are insensitive to changes in particle size and various dielectric coatings on the particles (col. 1 lines 61-64). Oldenburg et al. further teach wherein said organic material is ambiphilic (col. 10 lines 50-58) and that the specially tailored particles or particle mixtures can be added to various polymers during preparation by methods well known in the art including polyethelyne, PVA, etc. (col. 4 lines 39-43) and/or carboxylic acid linkages (col. 12 lines 31-33).

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It would have been obvious to one of ordinary skill in the art at the time of invention to have modified the apparatus and method as taught by Henrichs et al. in view of Link et al. and to have incorporated the teachings of Oldenburg et al. to provide more efficient response following EM radiation and longer survival time of the nanoparticle.

Henrichs et al. further teach wherein said wavelengths are in the visible and near infrared spectrum (col. 4 lines 19-30).

Allowable Subject Matter

Claims 22-23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record does not teach or suggest the specific thermal expansion range of the nanoparticle core.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nasir Shahrestani whose telephone number is 571-270-1031. The examiner can normally be reached on Mon.-Thurs: 7:30-5:00, 2nd Friday: 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


NSS
8/15/2007


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